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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/035,257	01/04/2002	Byung-Hee Kim	262/014	2929

7590 11/14/2003
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EXAMINER

GUERRERO, MARIA F

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 11/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,257

Applicant(s)

KIM ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This Office Action is in response to the Amendment filed October 8, 2003.

Claims 1-3 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al. (U.S. 6,376,355) in view of Hsu et al. (U.S. 6,143,645).

Yoon et al. teaches a method of fabricating a semiconductor device having a recess in an insulating layer on a silicon substrate (Abstract). Yoon et al. teaches depositing a barrier metal on a whole surface of the insulating layer including the substrate surface in the recess region, selectively depositing an anti-nucleation layer on the barrier metal except in the recess region (Fig. 2, 7-9, col. 1, lines 55-67, col. 2, lines 1-5, 12-15, 25-28, 60-63, col. 4, lines 60-65, col. 5, lines 17-23, 45-49, 63-64). Yoon et al. shows depositing a CVD-Al layer on the barrier metal in the recess region, sputtering (physical vapor deposition (PVD)) the Aluminum layer, and reflowing the PVD-Al layer

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(col. 3, lines 53-56, col. 5, lines 49-51, col. 7, lines 45-50, col. 8, lines 25-28, col. 9, lines 63-67, col. 10, lines 1-5). Yoon et al. teaches the metal layer having a thickness of 25-100 Angstroms (col. 5, lines 49-50, col. 6, lines 3-10, 25-35).

Yoon et al. does not specifically show depositing the metal or metal alloy for inhibiting aluminum migration on the anti-nucleation layer. However, Yoon et al. recites, as well known in the art, the necessity to avoid aluminum diffusion (col. 1, lines 33-40). In addition, Hsu et al. discloses depositing a thin diffusion barrier (inhibiting aluminum migration) layer (510) on the barrier metal except in the recess region (Fig. 2B, col. 1, lines 45-50, col. 3, lines 24-32, col. 4, lines 35-45, col. 6, lines 45-50).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Yoon et al. reference by including the metal or metal alloy for inhibiting aluminum migration as taught Hsu et al. in order to prevent junction spiking and electromigration (Hsu et al., col. 1, lines 59-65, col. 2, lines 47-50).

Response to Arguments

4. Applicant's arguments filed October 8, 2003 have been fully considered but they are not persuasive. Claims 1-3 stand rejected.

In response to applicant's argument that neither the Hsu et al. reference nor the Yoon et al. reference teaches or suggest depositing a metal or metal alloy for inhibiting aluminum migration on an anti-nucleation layer and a barrier metal except in a recess region, the examiner recognizes that each reference individually does not teach this recitation. However, a person of ordinary skill in the art would recognize that the

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combination of Yoon et al. and Hsu et al. meet this claimed language as stated in the Office Action mailed July 15, 2003. Therefore, the claims stand rejected.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Yoon et al. reference by including the metal or metal alloy for inhibiting aluminum migration as taught Hsu et al. in order to prevent junction spiking and electromigration (Hsu et al., col. 1, lines 59-65, col. 2, lines 47-50).

In response to applicant's argument that incorporating the thin diffusion barrier layer as it is taught by Hsu et al. reference into the devices of the Yoon et al. reference would not result in any substantive change to the devices of the Yoon et al. reference, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

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In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rhee et al. (U.S. 6,133,147) (of record) and Park et al. (U.S. 6,054,768) (of record) are cited as evidence to show that using blocking layer during aluminum deposition is well known in the art.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Maria Guerrero
Patent Examiner
November 7, 2003